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ABSTRACT

Self-efficacy, or a person's perception of his/her own mastery of a skill, affects subsequent task performance and predictions of future performance. To examine older adults' metamemorial knowledge with respect to predicting their performance on everyday and laboratory memory tasks, 28 adults (22 females, 6 males), aged 58 to 80 years, completed a memory self-efficacy questionnaire. Subjects then performed four everyday memory tasks from the questionnaire and four laboratory tasks. They completed a second questionnaire assessing depression and overall mood. An analysis of the results showed that self-efficacy level was higher for everyday tasks than for laboratory tasks, as was self-efficacy strength. Predictions and scores were not highly correlated. However, affective mood affected prediction and performance of laboratory tasks more than everyday tasks. Accuracy and performance were significantly correlated on everyday tasks. Individuals high in self-efficacy had low depression scores. Individuals high in self-confidence were more accurate in their predictions than low self-confidence individuals. These findings suggest that older adults will be accurate or will underestimate their performance when they are given the opportunity to reflect at some length about the nature of the memory tasks they will be asked to perform, and when they are fairly confident of their performance predictions. (BL)

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Predicting Everyday and Laboratory Memory Skill

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The present research was designed to clarify the nature of older adults' metamemorial knowledge with respect to predicting their own memory skills. This study examined metamemorial predictions about everyday memory and laboratory memory tasks to determine if "task knowledge" is critical for accurate prediction. The predictions were measured using a memory self-efficacy questionnaire where a complete memory task description was presented as the individual's prediction was made. With the memory self-efficacy questionnaire and a second questionnaire assessing affective status, this research included factors that have not been examined in previous metamemory prediction studies, namely the participants' feelings about themselves and their memory abilities.

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The concept of self-efficacy can be defined as a person's perception of his/her own mastery of a skill. It is related to predicting one's own ability to perform a specific future action in conditions that may be variable or uncertain (Bandura, 1981). Memory

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self-efficacy is affected by previous personal experiences involving memory and, in turn, it affects the way in which a person performs memory tasks. Low self-efficacy is related to less effort and persistence on difficult tasks and to higher anxiety during task performance (Bandura, 1981). Although self-efficacy measures have seldom been used with older adults, both Bandura (1981) and Rebok and Offermann (1983) have suggested that it may be a factor that affects cognitive performance among older adults, and Lachman and her colleagues have demonstrated a relationship between intelligence test performance and intellectual self-efficacy in the elderly (Lachman, Baltes, Nesselroade, & Willis, 1982).

Although this was essentially exploratory research, several hypotheses guided this investigation: Prediction accuracy and performance should be higher on the everyday tasks than the laboratory tasks because of greater task knowledge and familiarity. Affective status should be correlated with self-efficacy and with performance, as it should have an impact on both. Since self-efficacy can be viewed, in a sense, as performance-related affect, there should be a stronger relationship between self-efficacy and performance than between general affective status and performance.

The subjects for this study were all tested individually in the same testing room at a university. There were 22 females and 6 males from 58 to 80 years of age (M = 67.8, SD = 5.72). All of the subjects were recruited

initially to participate in a memory training program for older adults experiencing memory difficulties. As such, they may have had somewhat lower opinions of their memory abilities than most older adults. Nevertheless, there was a considerable range of self-efficacy ratings and many of the participants had fairly high memory self-efficacy scores.

The memory self-efficacy questionnaire developed for this research afforded individuals an opportunity to precisely define their performance expectations on specific memory tasks. The self-efficacy questionnaire described ten memory tasks, with five levels of difficulty on each task, for a total of 50 memory items. For each memory task, the five difficulty levels were arranged with the most difficult task performance level first, followed by easier levels. For example, one item read, "If I looked up 3 phone numbers in the phone book at the same time, I could remember 3 complete phone numbers." and the next item read, "If I looked up 3 phone numbers in the phone book at the same time, I could remember 2 complete phone numbers." Each item was followed by a "yes" or "no" to circle and a confidence scale from 10-100%. For any item where "yes" was circled, the subjects were also asked to circle the number indicating how confident they were that they could perform the activity. As Bandura recommends (Bandura, Reese, & Adams, 1982), the responses were actually scored as "yes" responses only if the subjects indicated at least 20% confidence in their ability to carry out the memory activity as described.

The number of "yes" responses indicated the number of memory activities the individuals felt that they could perform (self-efficacy level). The confidence ratings were summed across items to indicate the subjects' overall confidence in their abilities (self-efficacy strength). Strength and level measures were obtained for each of the ten tasks on the questionnaire, and an overall score was also calculated, reflecting total memory self-efficacy. In addition, items concerning laboratory memory tasks were combined for a laboratory self-efficacy score and items concerning everyday memory tasks were combined for an everyday self-efficacy score. The obtained scores for the 10 tasks are given in Table 1.

The results of t-test analyses indicated that self-efficacy level was higher for the everyday tasks than the laboratory tasks, $t(27) = 4.23$, $p < .001$, as was self-efficacy strength, $t(27) = 6.03$, $p < .001$. At the same time, the self-efficacy scores for the laboratory and everyday tasks were highly correlated, indicating that older adults who felt that they could perform very well on one type of task also felt that they could perform well on the other type of task, $r = .86$, $p < .001$ for level and $r = .88$, $p < .001$ for strength.

The ten tasks described on the memory self-efficacy scale included two fillers (remembering errands for a friend, ERRANDS, and

remembering the names of persons in photographs, NAMES) and eight tasks that were actually performed by the subjects during the testing session. For each task administered, the subject's performance "prediction" on the self-efficacy questionnaire was taken as the most difficult activity which the subject was at least 80% certain that s/he could perform. The eight tasks that were administered to the subjects consisted of four laboratory memory tasks and four simulated everyday memory tasks. Half of the subjects received the four everyday tasks first and half received the four laboratory tasks first. Within each set of four, there were four different presentation orders used.

Encoding time varied among the tasks and all of the recall tests were self-paced. There were four laboratory memory tasks. 1) Word Recall (WORDS): Twelve names of common objects were presented in six pairs of related words, each with AA frequency count (Thorndike & Lorge, 1944). There was an immediate written free recall test. 2) Maze Solving (MAZE): The experimenter described 10 steps needed for executing a paper and pencil maze. The subjects were asked immediately to carry out these moves to solve the maze (see Figure 1). 3) Digit Span (DIGITS): The subjects studied a number line of 21 digits for a maximum of three seconds. There was oral serial recall test directly after its presentation. 4) Picture Recall (PICTURES): Pictures of 16 common objects from the Peabody Picture Vocabulary Test were studied (self-paced study time) and recalled orally in an immediate recall test.

There were three simulated everyday memory tasks that were matched with the first three laboratory tasks described: 1) Grocery List Recall (GROCERY): The "grocery list" of a "sick friend" included 12 names of food products, presented in a conversational manner. The list contained six pairs of related foods, all with AA frequency count (Thorndike & Lorge, 1944). There was an immediate written free recall test. 2) Recall of Directions (MAP): The directions to a friend's new house were given immediately before the subject was asked to draw the route on a map. There were ten steps in the directions (see Figure 2). 3) Phone Number Recall (PHONE): Three telephone numbers in the city directory yellow pages had to be remembered "just long enough to get a pencil" to write them down in an immediate serial recall test. Study time was self-paced with a maximum of three minutes allowed. (4) (The fourth everyday task was not matched with an earlier laboratory task.) Object Location Recall (LOCATIONS): The participants were instructed to place 10 objects in different locations in the testing room. A delayed test for location recall (with eyes closed) was given directly after one of the other everyday tasks was completed. The test scores and predicted scores for all tasks are shown in Figure 3.

Finally, the subjects completed a questionnaire assessing depression and overall mood (Yesavage, Brink, Rose, Lum, Huang, Adey, & Leirer, 1983). This questionnaire followed the memory tests so it may have reflected not only the subjects' general mood, but also their feelings about themselves after performing the eight memory tasks,

including any anxiety or self-criticism related to their performance. The affective assessment scores indicated that this group of subjects was low in depression. Scores ranged from 2 to 20 (M = 8.11, SD = 4.90), where scores ranging from 0 to 9 are regarded as normal, and scores from 10 to 19 are regarded as an indication of mild depression.

Initial analyses using presentation order as a between-subjects factor resulted in no main effects or interactions for order. The analyses reported here were conducted without including order as a factor. The initial analysis included the three pairs of matched everyday-laboratory tasks and examined three within-subjects factors: task context (everyday vs. laboratory), prediction accuracy (prediction vs. score), and task type (grocery/word vs. map/maze vs. phone/digit). The results of this analysis are given in Table 2. Post hoc tests examining the three way interaction indicated that the predictions varied from the scores on four tasks. Performance was higher than predicted on two everyday tasks: GROCERY and MAP. Performance was higher than predicted on one laboratory task, WORDS, and lower than predicted on one laboratory task, MAZE. Although there was no significant difference between the predictions and scores for the PHONE and DIGIT tasks, this is not an indication of prediction accuracy since predictions and scores were not highly correlated.

Separate analyses were conducted to examine the

differences between predictions and scores on the LOCATION and PICTURES tasks. Performance was sigrificantly higher than predicted on the PICTURES task, $\underline{t}(27) = 4.64$, $\underline{p} < .001$, but was not different from the prediction for LOCATIONS. In fact, the LOCATIONS task is the only one for which predictions were highly accurate, as there was no difference between predictions and scores and predictions and scores were significantly correlated, $\underline{r} = .44$, $\underline{p} < .05$.

These results suggest that, generally speaking, these subjects did not understand the ease of everyday memory tasks relative to laboratory memory tasks. At the same time, the task for which their predictions were most accurate was the task which was probably most familiar to them--locating objects one has placed at an earlier time.

To examine the effects of affect and self-efficacy on performance and predictions, correlations were computed between the affective mood scores, level and strength of self-efficacy, task performance, and prediction accuracy. For these analyses, the task scores were combined for the four everyday tasks, and for the four laboratory tasks, and for all tasks. using a percentage correct score. For absolute prediction accuracy, the absolute difference between an individual's predicted score and his/her actual score was calculated and these differences were averaged across tasks. The correlations are given in Table 3. The most striking findings were strong correlations between

self-efficacy and performance and a greater effect of affective mood scores on laboratory task prediction and performance than on everyday task prediction and performance. Perhaps everyday memory predictions and performance were based more directly on the individuals' actual experience and task familiarity rather than their affective state, or perhaps temporary anxiety, affected performance on the laboratory tasks more than the everyday tasks. Additional analyses revealed a strong relationship between absolute prediction accuracy and performance, indicating that the best performers were those with the best self-knowledge of their memory abilities. Also, there was a stronger relationship between accuracy and performance on the everyday tasks than the laboratory tasks. For the everyday tasks, $r = .57$, $p < .001$, for the laboratory tasks, $r = .46$, $p < .01$, and for all tasks combined, $r = .60$, $p < .001$. This last finding is consistent with the notion that memory performance may be related to metamemorial knowledge, and that such knowledge may be somewhat more accurate for more familiar everyday activities.

These correlations suggested an important relationship between prediction, affective status, and performance. To further explore these relationships, median splits were used to divide the subjects into groups representing high and low affective mood scores, high and low prediction accuracy, high and low self-efficacy level, high and low self-efficacy strength, and high and low performance scores. Using these

groups as independent variables, and the initial scores as dependent variables, the only significant findings were as follows: (1) subjects with high self-efficacy strength scores differed in their affective mood scores, $F = 5.58$, $p < .05$, with the high self-efficacy group demonstrating low depression; and (2) subjects with high and low performance scores differed significantly in self-efficacy strength, $F = 5.20$, $p < .05$ and level, $F = 6.64$, $p < .05$, with the better performers, not surprisingly, showing higher self-confidence.

The final analyses were conducted to clarify the relationship between mood, self-efficacy, performance, and predictions. The median-split divisions for mood, self-efficacy strength, and level were used as the between-subjects factors in separate analyses with task context, prediction accuracy and task type as within-subjects variables. There were no main effects for affective mood or interactions with mood. The analyses for strength and level of self-efficacy yielded similar results, except that strength interacted significantly with prediction accuracy, while level did not. These results emphasize the importance of self-efficacy rather than affective state as a mediating factor in the prediction-performance relationship. The results of the analysis of strength are presented in Table 4. Post hoc tests examining the interaction of self-efficacy strength and prediction accuracy indicated that the participants with high self-confidence were accurate in predicting

their scores, while those with low self-confidence significantly underestimated their scores. The actual scores of the high and low strength groups (averaged across all tasks) were similar, (low strength $\underline{M}$ = 5.82, high strength $\underline{M}$ = 6.42), but their predictions were significantly different, (low strength $\underline{M}$ = 3.18, high strength $\underline{M}$ = 6.29).

In earlier studies where older adults were asked to make task predictions before performing memory tasks, they have overestimated their recall performance (Bruce, Coyne & Botwinick, 1982; Mason, 1981; Murphy, Sanders, Gabriesheski, & Schmitt, 1981). In contrast, these results do not show that older adults will overestimate their performance. This difference in our findings may be interpreted in several ways. One explanation is that these subjects were lower in self-efficacy than elderly "normals" so they had lower expectations. This seems to be an unlikely answer for if we examine the data from only half of the subjects, that is, the most self-confident ones, they were highly accurate in predicting their performance. A second explanation is that the subjects in earlier research did not understand enough about the tasks they were about to perform. This is possible, given the evidence here that the participants were more accurate in predicting their ability on the more familiar everyday memory tasks, whereas earlier research used only laboratory tasks. A third explanation is that the initial responses of the older adults in other research were not well thought out, and did not reflect a performance level that they were highly confident that they could

reach. In contrast, the questionnaire format for obtaining predictions in this research provided the older adults with a considerable amount of time to reflect on their exact predictions, since there were five items for each task, reflecting different difficulty levels, and each prediction was related to a degree of confidence. This format is recommended for future studies of memory prediction accuracy among older adults, to obtain a better understanding of the self-evaluation process.

In conclusion, this study explored the relationship between affective mood, self-efficacy, and memory performance on both everyday and laboratory memory tasks. The data indicated that older adults will be accurate or will underestimate their performance when they are given the opportunity to reflect at some length about the nature of the memory tasks they will be asked to perform, and when they are fairly confident of their performance predictions. The more familiar the task, the more accurate the prediction, and the better the task performance. Finally, as a metamemory framework would suggest, the best performers were also the most accurate predictors of their ability, with the greatest apparent knowledge of the person variables that affect their own performance.

Table 1

Means and standard deviations (in parenthesis) for memory self-efficacy scores

	LevelA	StrengthB
Everyday Tasks		
GROCERY	3.2 (1.4)	51.8 (25.3)
MAP	2.8 (1.4)	41.9 (24.2)
PHONE	2.8 (1.2)	48.3 (24.3)
LOCATIONS	3.9 (1.4)	67.7 (28.0)
ERRANDS	3.2 (1.2)	50.8 (22.9)
Combined	15.9 (5.1)	52.1 (19.6)
Laboratory Tasks		
WORDS	2.9 (1.2)	45.9 (21.4)
MAZE	3.5 (1.3)	50.7 (24.5)
DIGITS	2.1 (1.3)	29.6 (16.0)
PICTURES	3.1 (1.1)	49.3 (20.7)
NAMES	2.1 (1.3)	27.1 (18.9)
Combined	13.8 (5.2)	40.5 (17.0)
Overall tasks	29.7 (10.1)	46.3 (17.6)

A The maximum level score for each task is 5, and level scores are summed across tasks.

B The maximum strength score for each task is 100, and strength scores are averaged across tasks.

Table 2

Results of Analysis of Variance for Task Context, Prediction Accuracy, and Task Type

	df	F	p
Task Context	1, 27	42.75	.0001
Prediction Accuracy	1, 27	6.50	.05
Task Type	2, 54	21.21	.001
Context X Accuracy	1, 27	4.29	.05
Context X Task Type	2, 54	3.84	.05
Accuracy X Task Type	2, 54	9.75	.001
Context X Accuracy X Task Type	2, 54	5.78	.01

Table 3

Correlations Between Self-efficacy, Prediction Accuracy, Affective Mood, and Performance

	Percentage Correct	Absolute Prediction Accuracy	Affect
Everyday Tasks Only			
Self-efficacy strength	.44**	-.09	-.27
Self-efficacy level	.43*	-.08	-.28
Affect	-.12	-.10	
Laboratory Tasks Only			
Self-efficacy strength	.43*	-.26	-.37*
Self-efficacy level	.45**	-.03	-.40*
Affect	-.14	.29	
All Tasks Combined			
Self-efficacy strength	.47**	-.16	-.33*
Self-efficacy level	.46*	-.03	-.36*
Affect	-.13	.10	

* $p < .05$

** $p < .01$

Table 4

Results of Analysis of Variance for Task Context, Prediction Accuracy, and Task Type with Self-Efficacy Strength

	df	F	p
Self-efficacy Strength	1, 26	10.28	.005
Task Context	1, 26	41.19	.0001
Prediction Accuracy	1, 26	7.80	.01
Task Type	2, 52	21.76	.001
Accuracy X Strength	1, 26	6.40	.05
Context X Task Type	2, 52	3.75	.05
Accuracy X Task Type	2, 52	10.24	.001
Context X Accuracy X Task Type	2, 52	5.74	.01

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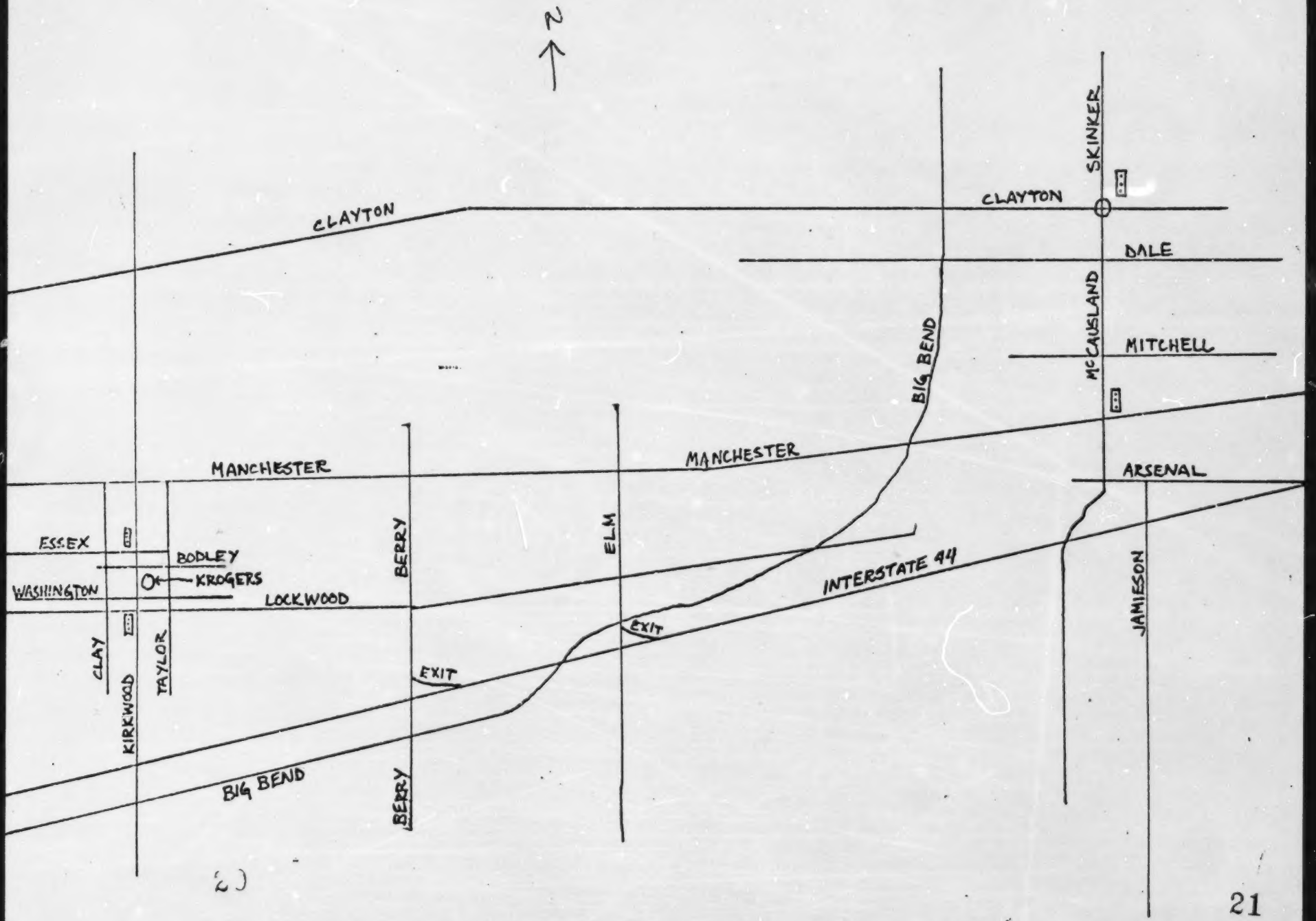
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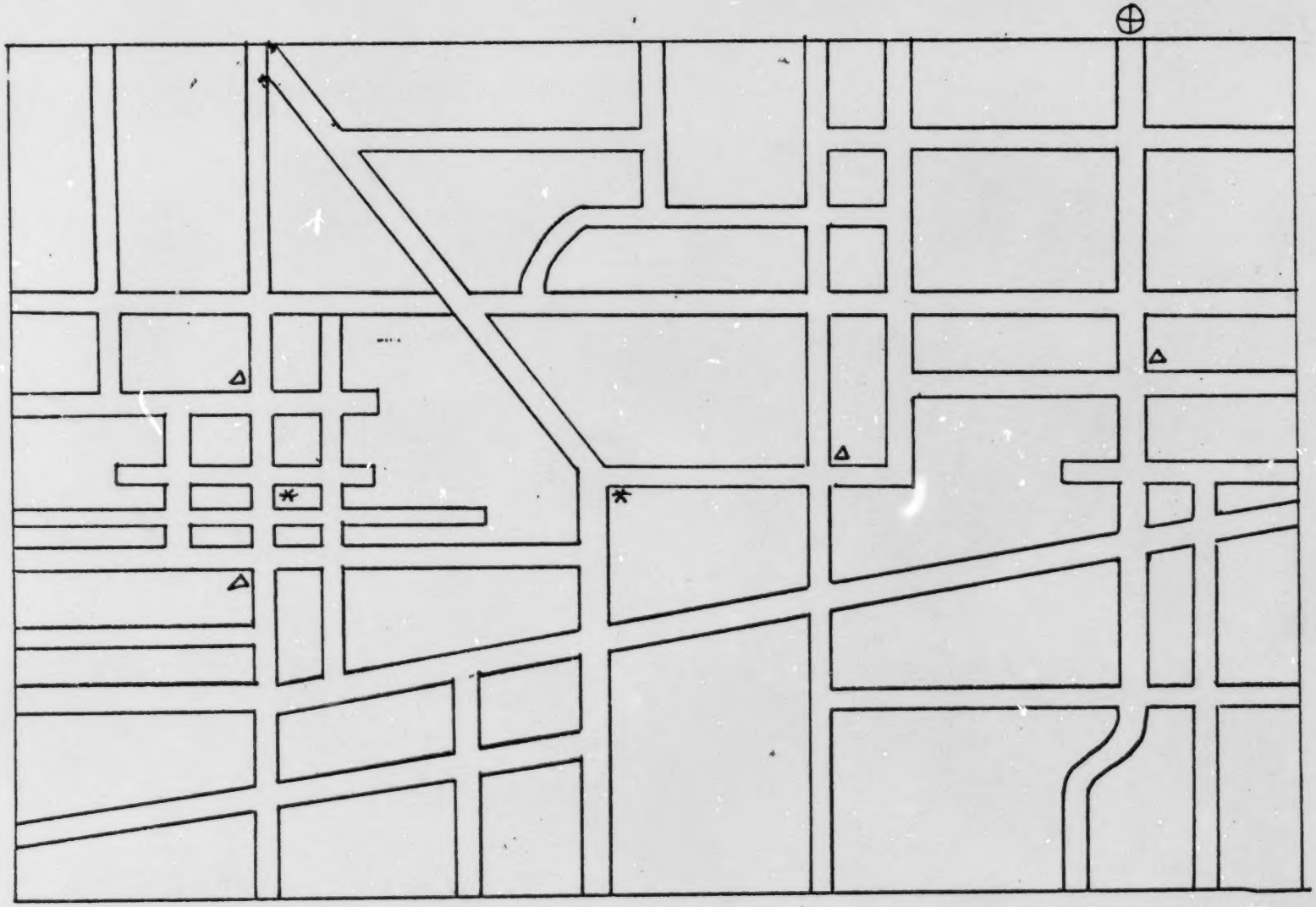

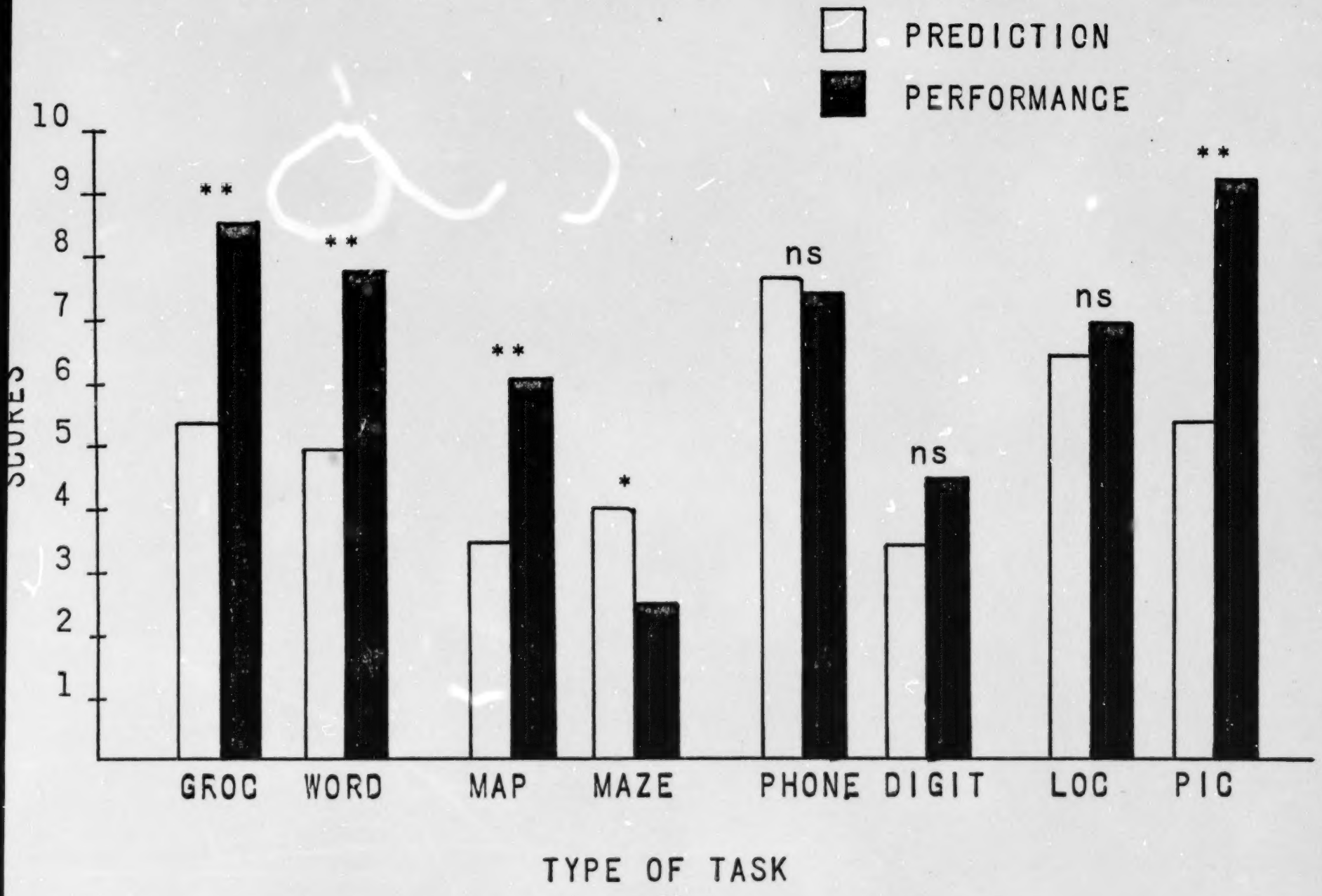
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